



Tactical Environmental Processor



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Demonstrated Performance



- ✓ Demonstrated Performance At Sea with NEXRAD
- ✓ No Adverse Impact on SPY-1
- ✓ Mission Improvements
- ✓ Demonstrated Navy Benefits

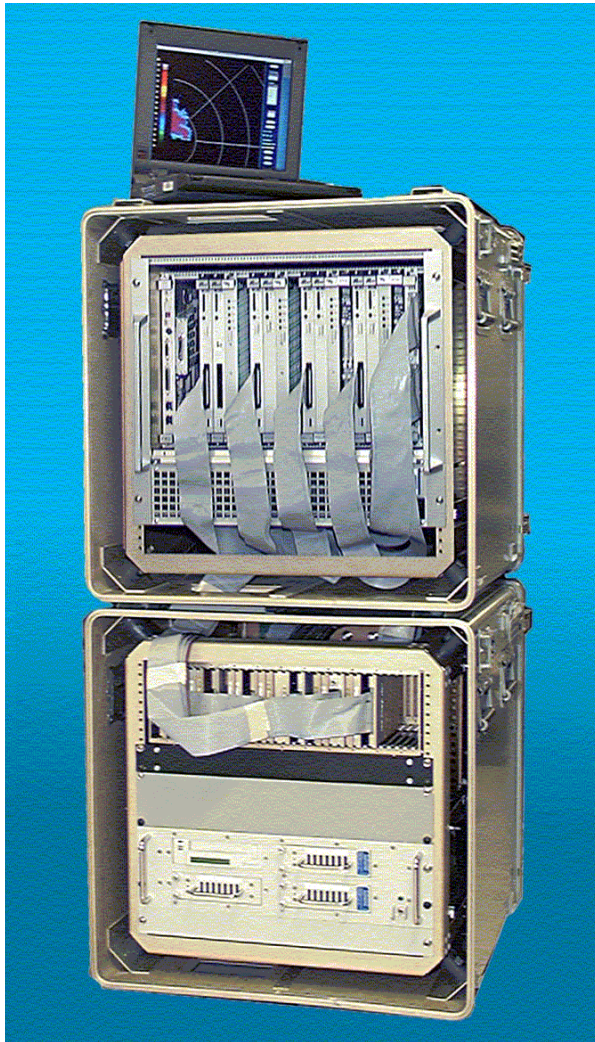


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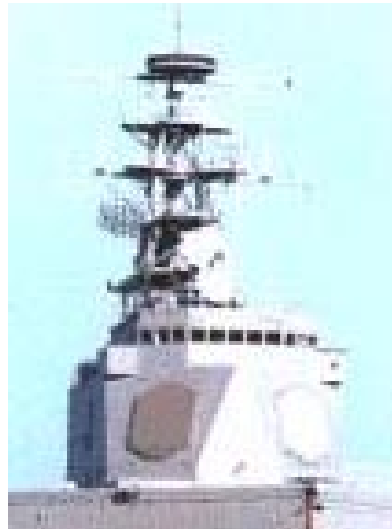
031201-2

Tactical Environmental Processor



Converts raw I/Q data from SPY-1 radar into spectral moments

- Tactical SPY-1 waveforms
 - Single Pulse → Reflectivity (dBZ)
 - Three Pulse → Reflectivity, Radial Velocity (m/s), and Spectrum Width (m/s)
- Pulse Doppler waveforms
 - Provide greater sensitivity for cloud/wind detection



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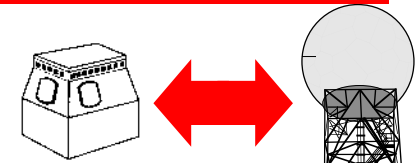
TEP Provides Accurate Reflectivity Measurements

Goal

- Validate Basic Spectral Moments from SPY-1 with NEXRAD

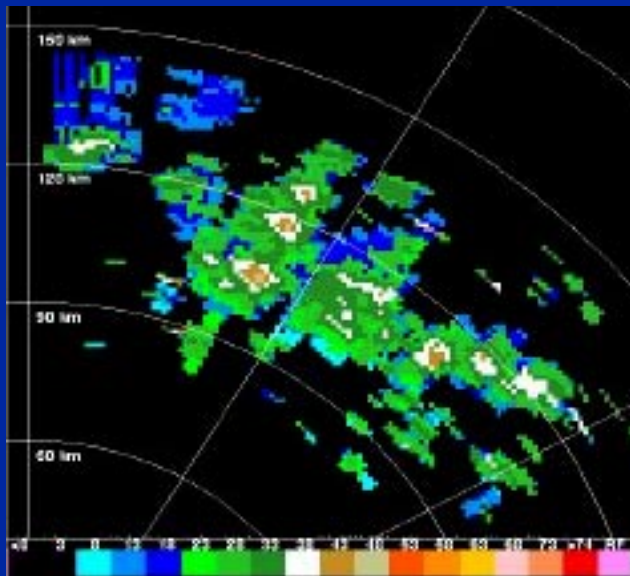
Result

- SPY-1 Matches NEXRAD Reflectivity, Velocity, Spectrum Width
- SPY-1 Demonstrates Better Sensitivity and Temporal Resolution



SPY-1 vs. NEXRAD

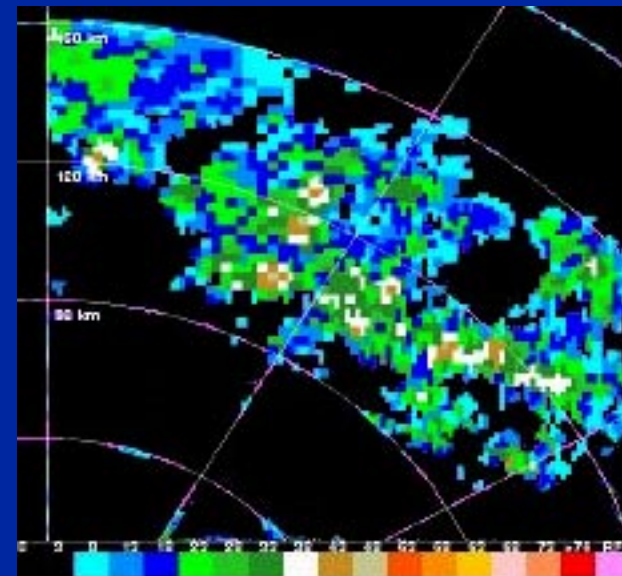
SPY-1 vs. NEXRAD Composite Reflectivity Hurricane Fran Remnants



SPY-1 (Single -Pulse)

*NOTE: Threshold Applied to SPY-1
Reflectivity Map Above Noise Floor*

*Data Collected
on SPY Weather
Experiment
Sept 6, 1996*



NEXRAD (~100-Pulse)



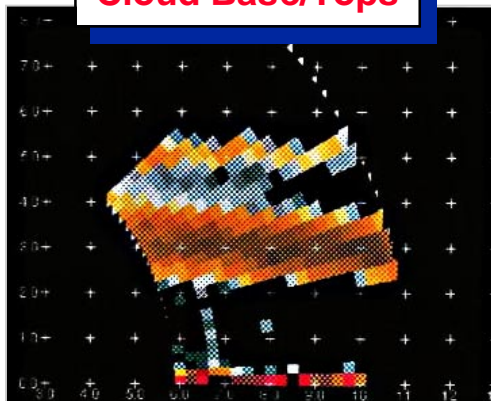
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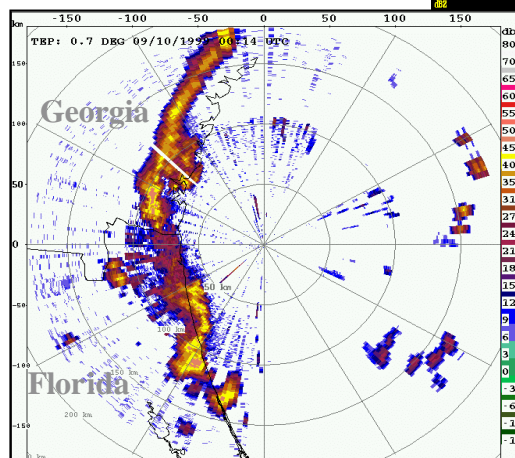
Demonstrated TEP Performance

Cloud Base/Tops

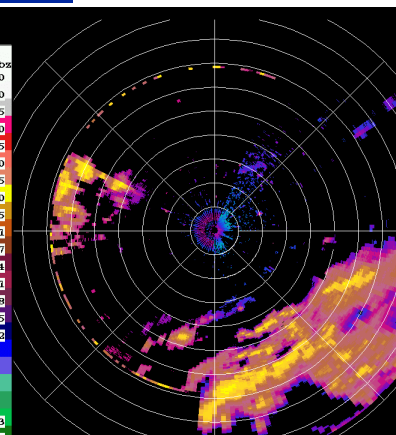


*Cloud Tops/Bases
Mar 18, 1997*

Hazardous Weather

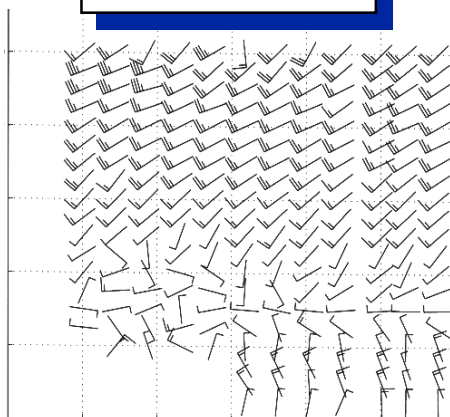


*Nighttime Squall off JAX
Sept 10, 1999*

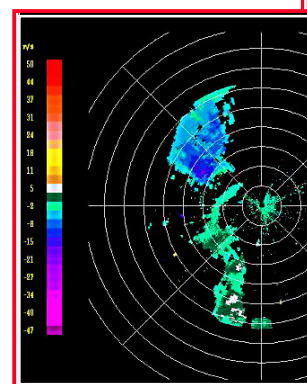


*Hurricane Dennis
August 30, 1999*

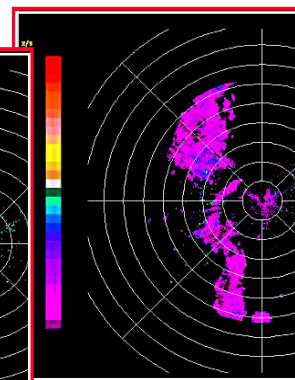
Wind Mapping



*Winds off JAX
Sept 10, 1999*



*Radial
Velocity*



*Spectrum
Width*

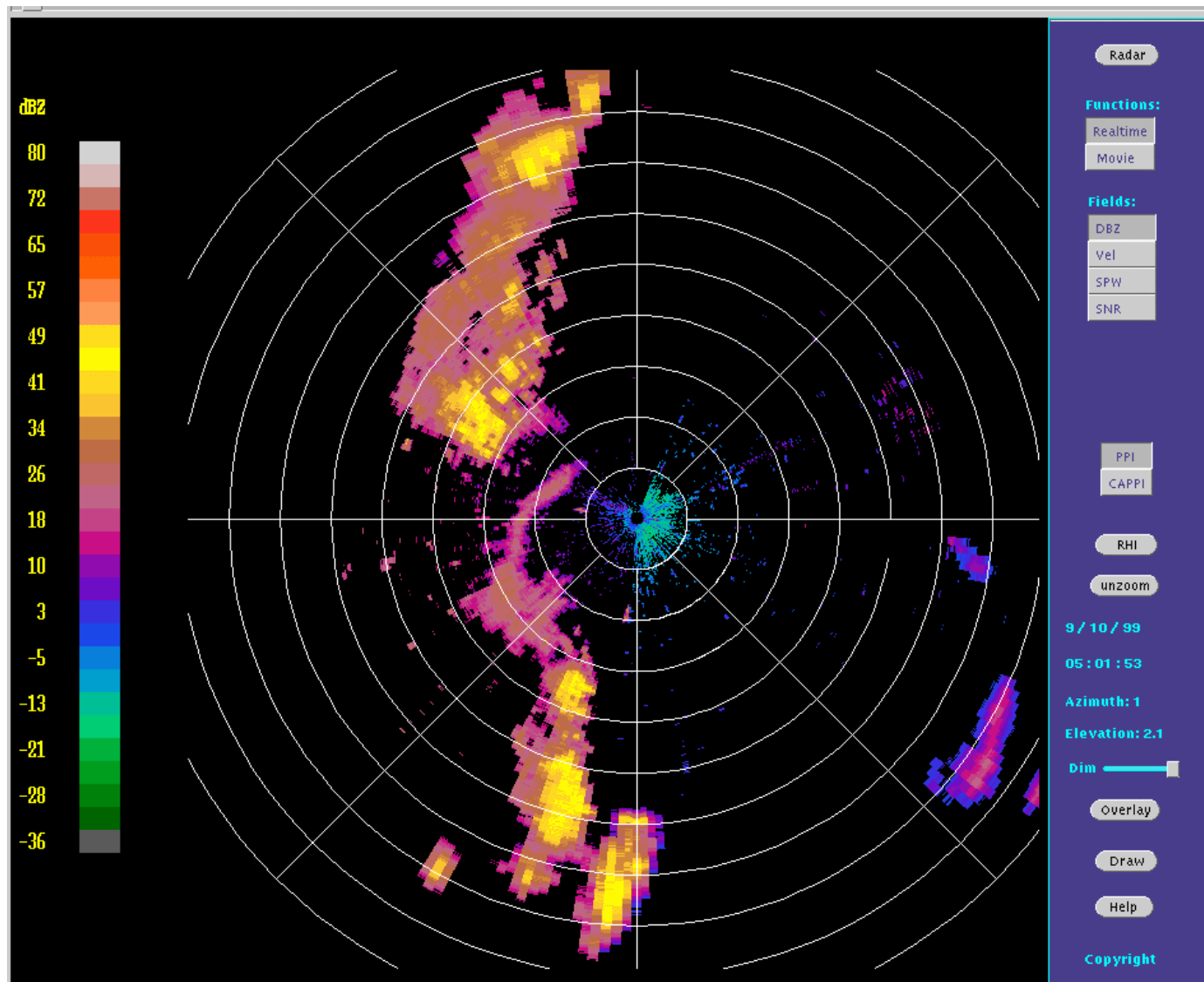


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Reflectivity Map from 9/10/99 (from USS O'KANE)



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TEP Supports Carrier Battlegroup



- Carrier battlegroup operations most weather sensitive in the Navy
 - Wind over the flight deck, visibility over strike areas, etc.
 - Lead times - days to hourly
 - Mesoscale model focus
- Limited accessible meso-networks
 - NEXRAD WSR-88D Quality Data
 - Satellite imagery can be obscured by high-altitude cloud cover

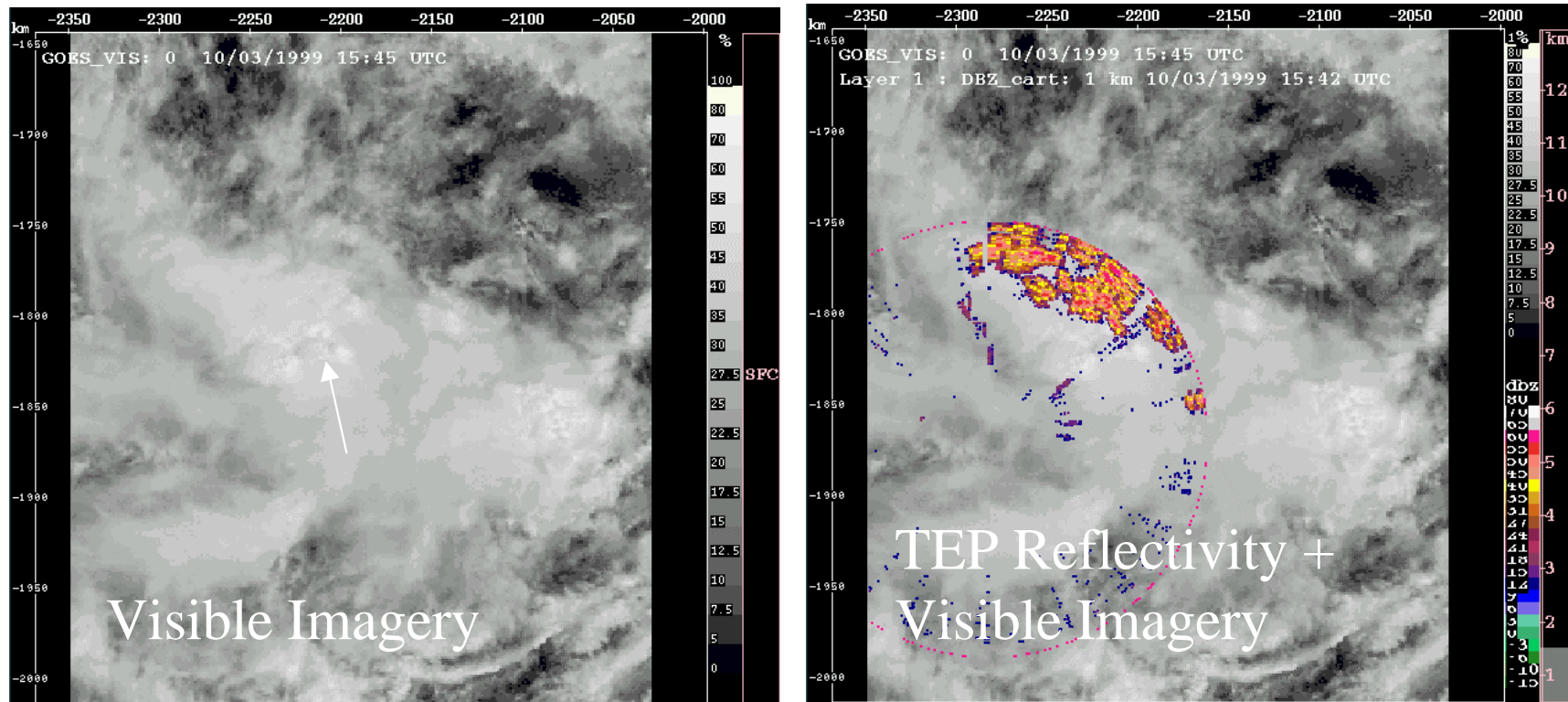


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Satellite Imagery with TEP Overlay



October 3, 1999 off west coast of Mexico

**Overshooting tops are present but cirrus shield obscures details below.
Adding TEP reflectivity shows the locations of convective cells**



Plots Courtesy of NCAR

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Summary

- TEP Expands Capability and Mission of SPY-1
- TEP Provides Timely METOC Radar Weather Data At Sea
- Does Not Interfere with SPY-1 Operation (Normal Scans)
- High-Sensitivity Mode Available for Clouds and Winds



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